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The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 10

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHN H. TREGILGAS

Appeal No. 1996-2086
Application 08/255,588¹

ON BRIEF

Before ELLIS, OWENS and WALTZ, ***Administrative Patent Judges***.

ELLIS, ***Administrative Patent Judge***.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 11, all the claims remaining in the application.

¹Application for patent filed June 8, 1994.

Claims 1, 8 and 10 are illustrative and read as follows:

1. A method of impurity gettering, comprising the steps of:

- (a) providing a substrate with solid gettering material on a surface of said substrate;
- (b) heating said substrate and gettering material to a first temperature greater than the melting point of said gettering material;
- (c) then cooling said substrate and gettering material to a second temperature below said melting point; and
- (d) removing said gettering material from said surface.

8. A method of impurity gettering, comprising the steps of:

- (a) providing a substrate with solid gettering material on a surface of said substrate;
- (b) heating said substrate and gettering material to a first temperature within 150EC of the melting point of said gettering material;
- (c) then cooling said substrate and gettering material; and
- (d) removing said gettering material from said surface.

10. A method of impurity gettering, comprising the steps of:

- (a) providing a substrate in fluid communication with a reservoir of gettering material;
- (b) heating said gettering material to a temperature above its melting point;
- (c) then condensing droplets of said gettering material on said substrate;

- (d) cooling said substrate and gettering material to solidify said droplets; and
(d) [sic, (e)] then removing said gettering material from said surface.

The references relied upon by the examiner are:

Fuller	2,784,121	March 5, 1957
Schaaake et al. (Schaaake)	4,504,334	March 12, 1985

The claims stand rejected as follows:

Claims 1 and 8 stand rejected under 35 U.S.C. § 102 (b) as being anticipated by Fuller.

Claims 1 through 11 stand rejected under 35 U.S.C. § 103 as being unpatentable over Fuller, the admitted prior art, and Schaaake.

We **reverse** both rejections and **remand** the application to the examiner.

The appellant's invention is related "to photodetectors based on narrow bandgap semiconductor materials and the processing of such materials" by removing fast diffusing impurities such as copper. Specification, p. 1. As is apparent from the claims, the appellant's method of "gettering" impurities from a solid substrate involves heating the substrate with a gettering material on its surface to a temperature (i) greater than the melting point of the gettering material (claim 1) or (ii) within 150EC of the melting point of the gettering material (claim 8), cooling the substrate and gettering material and then removing the gettering material. Alternatively, the appellant's method involves providing the substrate in a fluid communication with a reservoir of gettering material and heating the

gettering material above its melting point in order to condense droplets of the gettering material on the substrate. This is then followed by the cooling of the substrate to solidify the droplets and the removal of the gettering material (claim 10).

I.

According to the examiner, claims 1 and 8 are anticipated by Fuller's teachings

to place solid gettering material ie [sic, i.e.] metal (see col. 2 lines [sic, line] 65[])] on a semiconductor substrate, heating to fuse the material and simultaneously getter impurities from the substrate, see col. 7, line 25[,] where the metal was fused ie [sic, i.e.] melted, and then removed from the substrate. As to claim 8, the temperature is inclusive of the melting point of the gettering layer [Answer, p. 3].

We find the examiner's position untenable.

It is well established that anticipation requires that a prior art reference disclose every limitation of the claimed invention, either expressly or inherently. ***Mehl/Biophile Int'l. Corp. v. Milgraum***, 192 F.3d 1362, 1365, 52 USPQ2d 1303, 1305 (Fed. Cir. 1999); ***In re Schreiber***, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997); ***RCA Corp. v. Applied Digital Data Sys.***, 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984); ***Kalman v. Kimberly-Clark, Corp.***, 713 F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983), ***cert. denied***, 465 U.S. 1026 (1984). However, inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." ***In re Oelrich***, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981). Thus, in order for a claim

limitation to be inherent in the prior art, and thus anticipated by it, the examiner must establish that there is a necessary relationship between the claim limitation and the prior art method.

Here, we do not find that the Fuller patent discloses, either explicitly or inherently, the claim limitations of heating the substrate and gettering material to a temperature greater than, or within 150EC, of the melting point of the gettering material as required by claims 1 and 8, respectively. While we acknowledge the examiner's point that tin and zinc are molten at the lowest temperature of 450EC taught by Fuller (col. 3, lines 1-2), and that the temperature range may be between 450E-900EC which includes temperatures within 150EC of the melting point of antimony and silver, we note that the patent does not disclose that this is a necessary relationship between the gettering material and the temperature. Thus, while it cannot be gainsaid that the patent would have suggested using those materials at temperatures within the scope of the claims, one skilled in the art can, nevertheless, use Fuller's method of impurity gettering without necessarily selecting tin, zinc, antimony and silver and without employing the claimed temperatures. That is, as pointed out by the appellant, one skilled in the art could perform the method described by Fuller using gold which has a melting point of 1064EC. The possibility that one skilled in the art might employ (i) tin or zinc in Fuller's method, or (ii) antimony or silver at the upper limit of Fuller's temperature range, does not show anticipation. ***In re Arkley***, 455 F.3d

586, 587, 172 USPQ2d 524, 526 (CCPA 1972).

Accordingly, the rejection is reversed.

II.

Turning to the § 103 rejection, we find that the examiner is relying on (i) Fuller for teaching “a process generally applicable to any semiconductor,” (ii) pp. 1-2 of the specification for teaching “that MCT [sic, mercury cadmium telluride ?] or CdTe [cadmium telluride] are desirably gettered from Copper in the prior art, and that Te is a known gettering agent for same,” and (iii) the Schaafe abstract for teaching “that the gettering layer (Te) maybe [sic, may be] further covered with an inert, high melting capping layer (SiO₂) during the heating/gettering step.” Answer, pp. 3-4. The examiner concludes that

it would be [sic, have been] obvious to one of ordinary skill in the art to getter CdTe or MCT in the old manner of Fuller, and use Te as the gettering agent, optionally with an inert capping layer [Answer, p. 4].

We find the examiner’s position lacks merit.

We point out that it is well settled that the examiner has the initial burden of establishing a prima facie case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993); *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984). It is the examiner’s responsibility to show that

some objective teaching or suggestion in the applied prior art, or knowledge generally available [in the art] would have led one of ordinary skill in the art to combine the references to arrive at the claimed invention. ***Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.***, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996). Here, the examiner has not even begun to provide reasons, based on the applied prior art or otherwise, as to why it would have been obvious to one of ordinary skill in the art to provide a substrate with a solid gettering material on its surface and to heat said substrate and gettering material to a temperature greater than, or within 150EC of, the melting point of the gettering material as described in independent claims 1 and 8. Nor has the examiner provided any reasons as to why it would have been obvious to such persons to provide a substrate in fluid communication with a reservoir of gettering material, heat said gettering material to a temperature above its melting point and to condense droplets of said gettering material on said substrate as described in independent claim 10. Although we note the examiner's statement on p. 4 of the Answer that the phrase "thermal deposition" in Fuller means "that the metal is heated up to its vapor state and then condensed on the substrate," we find no evidence of record to support this statement.

In our view, the examiner has lost sight of the fact that independent claims 1, 8 and 10 are generic in nature and do not have any limitations as to specific substrates, gettering material or impurities to be removed therefrom. In addition, it appears that the examiner

has assumed that claims 1 and 8 are anticipated by the Fuller patent, and, thus, he has failed to provide any reasons as to why these claims would have been obvious in view of the applied prior art. Thus, what we have before us is a rejection which lacks a proper foundation and consists of undirected generalities.² A conclusion of obviousness cannot be based on generalities. *In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), **cert. denied**, 389 U.S. 1057 (1968); *In re Freed*, 425 F.2d 785, 788, 165 USPQ 570, 572 (CCPA 1970). Accordingly, absent a fact-based explanation from the examiner as to why the applied prior art would have rendered the claimed subject matter obvious to one of ordinary skill in the art, we are constrained to **reverse** the rejection.

III.

We remand this application to the examiner to analyze the breadth of the independent claims and to determine whether all the relevant prior art has been considered.

In addition, the examiner is directed to consider whether the teachings of Fuller as to the heating of a substrate (germanium) coated with suitable materials such as antimony, gold, silver, tin or zinc, to a temperature between 450E and 900EC, cooling the coated substrate and coating material, and removing the coated material (col. 2, line 60- col. 3,

² In view of the sweeping nature of the rejection, it is not clear to us which claims the examiner is actually addressing.

line 33) would have suggested to one of ordinary skill in the art, a method of impurity gettering comprising providing a substrate with solid gettering material on the surface and heating said substrate and gettering material to a temperature greater than, or within 150EC of, the melting point of said gettering material, cooling said substrate and gettering material, and removing said gettering material from the surface of said substrate.

Similarly, the examiner should consider whether the teachings of Schaake as to the heating of a substrate (an HgCdTe alloy) with the solid gettering material tellurium (melting point 449.5EC) to a temperature of less than 450EC, preferably about 280EC, would have suggested to one of ordinary skill in the art, a method of impurity gettering comprising providing a substrate with solid gettering material on the surface and heating said substrate and gettering material to a temperature greater than, or within 150EC of, the melting point of said gettering material, cooling said substrate and gettering material, and removing said gettering material from the surface of said substrate.

In making these considerations, the examiner should clearly set forth, on the record, any findings of fact and any reasons for concluding that the claimed invention would have been obvious to one of ordinary skill in the art. We remind the examiner that it is the responsibility of this tribunal to review his factual findings and conclusions of law, and not to examine the case in the first instance and to formulate a rejection based on the references

which he provides. By reflecting on the breadth of the independent claims and the teachings of all the relevant prior art, we believe that the examiner will be in a better position to determine the patentability of the dependent claims.

Response to Dissent

For the reasons set forth above, we disagree with the dissent that claim 1 is anticipated by the teachings of Fuller. Thus, it follows that we do not agree that, without a fact-based explanation from the examiner, said patent would have rendered the claimed subject matter obvious under the doctrine that anticipation is the epitome of obviousness. ***In re Skoner***, 517, F.2d 947, 950, 186 USPQ 80, 83 (CCPA 1975); ***In re Pearson***, 494 F.2d 1399, 1402, 181 USPQ 641, 644 (CCPA 1974).

As pointed out in our Decision, we reversed the obviousness rejection due to the lack of any factual findings by the examiner with respect to independent claims 1, 8, and 10, and not because of any deficiencies in the applied prior art. In circumstances such as this, this Board has two options: (1) remand the case to the examiner to provide an explanation as to why the claimed invention would have been obvious to one of ordinary skill in the art in view of the applied prior art, or knowledge generally available in the art (M.P.E.P. § 706.02(j)), or (2) make our own findings of fact and legal conclusions and, thus, set forth a new ground of rejection (37 C.F.R. § 1.196(b)). We chose the former alternative. In our view, the dissent has not affirmed the rejection set forth by the examiner.

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Rather, he has made new findings of fact, and applied a new reference. Thus, the dissent has clearly made a new ground of rejection.

REVERSED AND REMANDED

Joan Ellis)	
Administrative Patent Judge)	
)	BOARD OF PATENT
)	APPEALS AND
)	INTERFERENCES
Thomas A. Waltz)	
Administrative Patent Judge)	

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OWENS, *Administrative Patent Judge*, dissenting.

Because appellant states that the dependent claims stand or fall with the independent claim from which they depend (brief, page 3), I address only the independent claims, i.e., claims 1, 8 and 10). See 37 CFR § 1.192(c)(7)(1995).

Rejections of claim 1

Fuller discloses a method for impurity gettering by coating a surface of a substrate with a metal or alloy as a gettering material, heating and then cooling the substrate and gettering material, and removing the gettering material from the surface (col. 1, line 70 - col. 2, line 5; col. 3, lines 28-33). The coating is carried out by dipping the substrate in a molten bath of the metal or alloy, or by electroplating or thermal deposition (col. 2, lines 53-55). Fuller teaches that metals which have been found to be particularly suitable for use with a germanium substrate are antimony, gold, silver, tin and zinc (col. 2, lines 63-65). The disclosed temperatures to which substrates coated with gettering material are heated are 450-900EC (col. 3, lines 1-2) and at least 500EC (col. 8, lines 16-18).

As pointed out by the examiner (answer, page 5), the melting points of tin and zinc are, respectively, 232EC and 419.5EC. Thus, when a substrate coated with these materials is heated to any temperature disclosed by Fuller, the gettering material is at a temperature above its melting point as required by appellant's claim 1.

For the above reasons, Fuller discloses a method which includes all of the

limitations of appellant's claim 1. Consequently, I would affirm the rejection under 35 U.S.C. § 102(b). Because anticipation is the epitome of obviousness, see *In re Skoner*, 517 F.2d 947, 950, 186 USPQ 80, 83 (CCPA 1975); *In re Pearson*, 494 F.2d 1399, 1402, 181 USPQ 641, 644 (CCPA 1974), I would affirm the rejection under 35 U.S.C. § 103. Moreover, even if using tin or zinc as the gettering material in Fuller's method were considered to involve a choice, Fuller would have fairly suggested, to one of ordinary skill in the art, use of any of the five disclosed metals, including tin and zinc. Thus, use of tin and zinc would have been *prima facie* obvious to such a person.

Appellant argues that Fuller's immersion in molten gettering material appears to be a solvent extraction method rather than appellant's coating method (brief, page 3). Fuller discloses an example in which solvent extraction is used (col. 6, lines 5-11). However, in the portion in which Fuller discusses coatings, he discloses that a coating is formed by dipping the substrate in a molten bath, and discloses that the coated substrate then is heated (col. 2, lines 53-54 and 66-70). This disclosure, particularly when read in light of the teaching that electroplating and thermal deposition are alternative coating methods (col. 2, lines 53-55), indicates that the dipping in a molten metal bath is a coating method rather than a solvent extraction method.

Appellant argues that it is unclear what Fuller means by “thermal deposition” (brief, page 3). Appellant, however, provides no evidence that this term would have been unclear to one of ordinary skill in the art. Appellant provides only attorney argument, and arguments of counsel cannot take the place of evidence. **See *In re De Blauwe***, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984); ***In re Payne***, 606 F.2d 303, 315, 203 USPQ 245, 256 (CCPA 1979); ***In re Greenfield***, 571 F.2d 1185, 1189, 197 USPQ 227, 230 (CCPA 1978); ***In re Pearson***, 494 F.2d at 1405, 181 USPQ at 646 (CCPA 1974).

Appellant concludes that because Fuller’s immersion method appears to be solvent extraction and because it is unclear what is meant by “thermal deposition”, it is necessary to focus only on Fuller’s examples (brief, page 3). This argument is not well taken because Fuller’s disclosure is not limited to the examples. **See *In re Fracalossi***, 681 F.2d 792, 794 n.1, 215 USPQ 569, 570 n.1 (CCPA 1982); ***In re Mills***, 470 F.2d 649, 651, 176 USPQ 196, 198 (CCPA 1972).

Appellant argues that “Fuller’s requirement that the gettering metal form an alloy with the semiconductor at less than the melting point of the semiconductor suggests forming a eutectic alloy in contrast to melting the metal for gettering purposes” (brief, page 4). This argument is not persuasive because appellant’s claim 1 does not exclude a method in which the gettering material forms a eutectic alloy. What the claim

requires is that the gettering material is heated to a temperature higher than the melting point of the gettering material. As discussed above, Fuller provides such a disclosure for tin and zinc gettering materials.

Rejection of claim 8

Fuller's disclosed temperature range of 450-900EC for a germanium substrate includes temperatures which are within 150EC of the melting points of antimony (631EC) and silver (962EC). Fuller, however, does not disclose using these metals at heating temperatures which are within 150EC of their melting points. For appellant's claimed invention to be anticipated, the reference must lead one of ordinary skill in the art to a method which falls within the scope of the claim "without *any* need for picking, choosing, and combining various disclosures not directly related to each other by the teachings of the cited reference." ***In re Arkley***, 455 F.2d 586, 587, 172 USPQ 524, 526 (CCPA 1972). To arrive at appellant's invention, such a selection, i.e., choice of antimony or silver in combination with a heating temperature within 150EC of their melting points, is required. I therefore would reverse the rejection of claim 8 under 35 U.S.C. § 102(b).

However, Fuller's teaching that the heating temperature for a germanium substrate can be 450-900EC (col. 3, lines 1-2) would have fairly suggested, to one of ordinary skill in the art, use of any of these temperatures with any of the disclosed metals, including

antimony and silver. The method recited in appellant's claim 8, therefore, would have been ***prima facie*** obvious to one of ordinary skill in the art over Fuller. For this reason and because appellant has not provided any argument regarding claim 8 which is not addressed above, I would affirm the rejection of claim 8 under 35 U.S.C. § 103.

Rejection of claim 10

Appellant's claim 10 requires that droplets of gettering material are condensed on the substrate. The examiner argues that Fuller's term "thermal deposition" encompasses heating metal to its vapor state and then condensing it on the substrate (answer, pages 3-4). Appellant argues (brief, page 4): "Fuller's examples nowhere hint at droplets of liquid gettering material, the Examiner's interpretation of 'thermal deposition' seems overly optimistic."

Appellant again is limiting his consideration to the examples which, as stated above, is improper. The relevant question is whether Fuller's disclosure of use of "thermal deposition" would have fairly suggested to one of ordinary skill in the art at the time of appellant's invention, use of a method in which droplets of metal are condensed on the substrate surface.

The examiner's argument regarding how one of ordinary skill in the art would have interpreted "thermal deposition" is reasonable.³ For this reason and because appellant has not provided evidence or reasoning which shows that such a person would have interpreted the term differently, I conclude that the invention recited in appellant's claim 10 would have been obvious to one of ordinary skill in the art within the meaning of 35 U.S.C. § 103. Accordingly, I would affirm the rejection of this claim over the applied prior art.

_____) BOARD OF PATENT
Terry J. Owens) APPEALS AND
Administrative Patent Judge) INTERFERENCES

³ See, e.g., 8 **McGraw-Hill Encyclopedia of Science and Technology** 336-37 (McGraw-Hill 1971) ("**Vapor deposition**. A thin specular coating is formed on metals, plastics, paper, glass, and even fabrics. Coatings form by condensation of metal vapor originating from molten metal" (A copy is provided to appellant with this decision.)

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